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ABSTRACT

The use of a combination of traditional cognitive admissions criteria and noncognitive variables in predicting retention of college students is discussed. The focus is on improving prediction by analyzing various subgroups separately rather than using the entire population as a sample. The subjects were freshmen in the fall semester of 1978 at a predominantly black university. Retention status was studied for a 5-year period for two subgroups: remedial versus regularly admitted students, and males versus females. Data were collected on race; sex; retention status; Scholastic Aptitude Test (SAT) scores; high school class rank; and noncognitive data, including motivational variables (e.g., extent of studying, ambition, satisfaction with grades). Higher multiple correlations between retention status and the various combinations of predictors were found for remedial students 4 of the 5 years after entry and for males as opposed to females in the fourth and fifth year after matriculation. The noncognitive data were collected during the first month of the freshman year; however, these variables could be studied prior to the admissions decision. (Author/SW)

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PREDICTING ACADEMIC RETENTION AMONG POPULATION SUBGROUPS: THE USE OF NON-COGNITIVE PREDICTORS

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This paper was presented at the Twenty-Fourth Annual Forum of the Association for Institutional Research held at the Hyatt-Regency in Fort Worth, Texas, May 6-9, 1984. This paper was reviewed by the AIR Forum Publications Committee and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC Collection of Forum papers.

Daniel R. Coleman, Chairman
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Abstract

This paper explores the use of a combination of traditional cognitive admissions criteria and non-cognitive variables including motivational variables in predicting retention of students in college. The focus of the paper is on improving prediction by analyzing various subgroups separately rather than using the entire population as a sample. The subjects were freshmen at a predominantly black university, retention status was studied for a five year period and the subgroups were (1) remedial vs. regularly admitted students; and (2) males vs. females. Higher multiple correlations between retention status and the various combinations of predictors were found for remedial students four of the five years after entry and for males as opposed to females in the fourth and fifth year after matriculation.

PREDICTING ACADEMIC RETENTION AMONG POPULATION SUBGROUPS:
THE USE OF NON-COGNITIVE CRITERIA

Selecting those high school graduates who are most likely to persevere to an undergraduate degree is a problem of long-standing among academic administrators in every college and university in the country. Despite the overall stability of retention rates over the last 100 years (about 55%) (Tinto, 1982), there are different rates for different population subgroups. In a study conducted by Gosman, Dandridge and Nettles (1983), 56.1% of Whites graduated within five years compared with 35.3% of Blacks. They also found different rates for students of different backgrounds within racial subgroups.

Ayres (1983) in a study comparing National Teacher Examination (NTE) scores of students from five predominantly black and 10 predominantly white universities found that disaggregating the data by race was not sufficient to explain differences in achievement and concluded that the institutions themselves accounted for some differences among black and among white students. Tinto's attrition model (1975) also cites institutional congruence with student academic and social needs as being highly important in increasing retention rates. Examining Tinto's concepts of academic and social integration, Pascarella and Chapman (1983) found that disaggregating attrition data by institutional type yielded differences between 4-year residential colleges and 2- and 4-year commuter institutions.

By not disaggregating retention/attrition data, important explanatory variables can be masked. In addition, Tinto (1982) has noted the need to take account of the longitudinal character of the term "dropout". "Stop-outs" and transfer students, for instance, may take longer than four years to complete an undergraduate education and, as Astin (1977) points out, no student can be properly classified until he or she either obtains a degree or dies without one. Examining attrition after one, two, three, or even four years does not allow for variation in student progression rates which Gosman et.al. (1983) found to vary considerably between white and black students.

While these methodological issues plague the attrition researcher, attrition for the traditionally black college is a survival issue. Changes in enrollment patterns over time have seriously eroded the never-too-firm footing of these institutions. About one in five black college students now attends a traditionally black institution as compared to the early 1970's when traditionally black colleges enrolled over half of black college students in the states where they are located (Hill, 1983).

Faced with the impact of the aggressive recruitment policies of traditionally white institutions on the available pool of talented black students, black colleges are being forced into a reexamination of their own recruitment policies. Increasing the number of non-black students is one alternative, one which has

been required of some institutions by the courts (see for example the Consent decree filed in the U.S. District Court for the Eastern District of North Carolins, 1979).

Another strategy involves the reexamination of traditional "success" predictors, including non-cognitive, motivational factors in the retention models. Some of the work cited earlier supports this strategy. Further, some recent research on black students in traditionally black colleges presents evidence that this is a promising approach.

There is evidence, for instance, that non-cognitive variables when used in conjunction with standardized test scores and high school rank can better predict long term college retention (four or five years or to graduation) than test scores alone or test scores and high school rank combined. The value of models containing these predictors becomes particularly apparent when population subgroups are studied. Pratt and Felder (1982), Pratt (1983), and Gentemann and Pratt (1983) examined the value of non-cognitive variables in predicting the success of students in a traditionally black college and in identifying those most likely to persist. These studies demonstrate that for certain subgroups within the population (remedial vs. regularly admitted students, males vs. females) certain motivational questions improved the predictability of enrollment/graduation rates better than SAT scores and high school rank either alone or combined.

METHOD

The data used in this study pertain to students who entered the university as freshmen in the fall semester of 1978. The data file used for the analyses was compiled from three sources:

1. Data on race, sex and retention status of each student were taken from a file used in reporting retention rates to the state governing agency and to the federal government.
2. Data relating to admissions, including Scholastic Aptitude Test (SAT) scores and rank in the high school class (HSR) were taken from the university admission files for 1978.
3. Non-cognitive data were collected on a freshman survey given to all 1978 entering freshmen early in the fall semester of 1978. Seventy-five percent of the freshmen entering the university that year completed the survey.

These three sources were merged using the merge capabilities of the Statistical Analysis System (SAS, 1982), creating the data file used in all of the analyses. The file contains admissions, rention and survey data for 655 students, although the number included in individual analyses varies depending on the amount of missing data and on whether a particular procedure used a case-by-case or list-wise method of treating missing data.

ANALYSIS PROCEDURES AND RESULTS

The analysis procedure was a two step process. In the first step, two-way analyses of variance were computed with the students' retention status in a particular year (enrolled or graduated as opposed to suspended or discontinued) as one independent variable and enrollment status (regularly admitted student or remedial student) as the second independent variable. (A remedial student is one who had a predicted grade point average between 1.8 and 2.0. These students were admitted to the University, but were required to take their freshman English and mathematics courses in the Academic Skills Center rather than in the respective departments). Dependent variables were responses to various questions on the freshmen survey described above. The responses used as dependent variables were chosen to be representative of the variables that have been found to be important in predicting student retention in past studies. Table 1 contains a list of these questions. From this set of analyses, those variables on which there was a significant interaction between enrollment status and admission status in any of the five years were chosen for use in the regression analyses. The interaction was used as an indicator because only the interaction differentiated effects on the two subgroups. These variables are flagged on Table 1.

The procedure was repeated using sex rather than admission status as the the second independent variable.

TABLE 1

Non-cognitive Variables Used in the Study with Variables Interacting Significantly with Retention Status Flagged

Variable	Interaction of Status/ Retention	Interaction of Sex and Retention
1. AGE--What is your age?	yes	
2. COLLEGE-GOING-- What percent of students in your high school class went directly on to a community college, or two or four year college?	yes	
3. F'OCCUP--Which of the folllowing best describes your father's occupation?		
4. M'OCCUP--Which best describes your mother's occupation?	yes	yes
5. INCOME--What is your best estimate of the total income of your parental family?	yes	yes
6. F'EDUC--How much formal education does your father have?	yes	
7. M'EDUC--How much formal education does your mother have?	yes	yes
8. AMBITION--How important is it to your parents that you go to college?		
9. GRADES--How important was it to your parents that you received good grades in high school?		yes
10. STUDIED--Compared with your classmates, how much would you say you studied in high school?	yes	
11. WORKER--Do you think your fellow students in high school thought of you as a hard worker?		
12. DEAN--Did you try harder to get on the Dean's list than the average student in your high school class?		

TABLE 1 (continued)

Variable	Interaction of Status/ Retention	Interaction of Sex and Retention
13. PERSIST--Do you tend to give up or delay on uninteresting assignments?		yes
14. SATISFY--In terms of your own satisfaction, how much importance do you attach to getting good grades?	yes	
15. ASSIGN--Did you regard yourself as a more consistent and harder worker than the typical student in your high school class?		
16. LEVEL--What is the highest level of education you plan to complete beyond high school?		
17. CAREER--Which of the following statements most accurately describes your present feelings about your career directions?		
18. POSTBA--After obtaining your bachelor's degree, do you expect to continue your education?		

Five stepwise multiple regression analyses were then computed using retention status in 1979, 1980, 1981, 1982, and 1983 as the dependent variables and the SAT verbal (SATV) scores, SAT math (SATM) scores, rank in the high school class (HSR) and the variables chosen as described above as predictor variables. Separate analyses were run for the total group, for regularly admitted students and for students admitted to a remedial program. Table 2 contains these results.

As expected, there were differences in the variables that contributed to the regression equations for male and for female students, and for remedial and regularly admitted students. In addition, there were substantial differences in the size of the squared multiple correlations for the remedial and regularly admitted students. One factor of particular interest is that the motivation variable (STUDIED) appeared as a significant predictor of retention for the first, fourth and fifth years for remedial students while only age and cognitive variables (SAT scores and HSR) were predictors for regular students in any year.

TABLE 2

Summary of Separate Stepwise Regressions for Remedial and Regularly Admitted 1978 Freshmen

Retention Year	Remedial Students		Regular Students	
	R^2	Variables	R^2	Variables
1979	.14	AGE, STUDIED, HSR	.009	AGE+
1980	.06	M'EDUC	.03	SATM, HSR
1981	--- *	---	.02	HSR
1982	.09	STUDIED, SATV+	.03	AGE+, HSR+
1983	.17	INCOME, STUDIED, SATV+	.04	AGE+, HSR

* No variables met the minimum criteria of .15 for entrance in the model.

\+ Negative Correlation.

The same procedure was then followed for males and females but with the remedial and regularly admitted students combined. The survey variables used in this analysis were those for which

significant interactions between retention status and sex occurred in the preliminary analyses. Table 3 contains the results of these analyses.

TABLE 3

Summary of Stepwise Regressions for Male and Female Students

Retention Year	Females		Males	
	R^2	Variables	R^2	Variables
1979	.06	INCOME, SATV*, SATM	.08	M'EDUC, PERSIST*, HSR
1980	.03	M'EDUC, HSR	.12	PERSIST*, HSR
1981	.05	HSR	.07	PERSIST*, HSR
1982	.09	M'EDUC, GRADES, HSR	.12	F'OCCUP PERSIST* HSR
1983	.08	M'EDUC, PERSIST, HSR	.14	PERSIST*, HSR

* Negative Correlation

The pattern of results for this pair of analyses is similar to the pattern which appeared in the analyses of regular and remedial students. Specifically, the multiple correlations for one group (males) is consistently higher than the correlations for the other group. The differences in the type of variable are not quite so apparent. The rank in the high school class (HSR) is a significant predictor of retention for males in all five years and for females in four of the five years studied. One

variable which appears as a predictor for males in all five years is PERSIST (See Table 1 for definition). No single variable appears as consistently for females although M'EDUC is a predictor in three of the five years.

DISCUSSION

Both Tables 2 and 3 demonstrate the need to look further for predictor variables for females and regularly admitted students. In no year studied is there a squared multiple correlation of .10 or higher for either group*.

The subgroups which emerge in this study as being of special interest are the remedial students and the male students. As already noted, STUDIED emerges as an important predictor for remedial students, particularly if we focus our atention on retention/graduation in the fourth and fifth years. As interesting although more difficult to understand is the contribution of SAT verbal scores. As indicated in Table 2, SATV is negatively correlated with retention for remedial students. Because STUDIED appears as a predictor of retention for these students it is possible that we have a unique personality type emerging. These students may be low in aptitude but hard workers.

Another explanation, possibly complimentary to the first, is that these students are "sleepers", scoring low on standardized examinations but possessing other characteristics which enable them to succeed in college. In a study involving

*Female students are only slightly overrepresented among the regularly admitted population. Thus the low R2's for the latter are not simply an artifact of the sex composition of the group.

cultural brokers in a bicultural educational opportunity program, Gentemann and Whitehead (1983) found that admissions criteria which looked for "street smarts" were very successful in predicting two-year completion rates for non-traditional minority students. The same phenomenon may be occuring with the remedial students under discussion. Their experiences in the Academic Skills Center may have fostered their progress as well.

Examining the important predictor variables for males is likewise intriguing. HSR and PERSIST appear in every year studied. As Table 3 shows, HSR is also an important predictor for females and PERSIST does appear in the fifth year for female students, although for females there is a positive correlation with retention and for males, there is a consistent negative correlation. The latter is not an expected finding. One would anticipate that a student who is more likely to give up on uninteresting assignments would not experience much success in college since not all classroom assignments are of the highest interest. One possible explanation is that these male students simply delay the completion of uninteresting tasks rather than giving up altogether. This is not a totally satisfactory explanation, however. Further questioning on the next Freshmen survey may reveal a better explanation of this phenomenon.

CONCLUSIONS

The growing body of literature which examines retention using non-cognitive variables (Astin, 1978; Tinto, 1975; Pascarella and Chapman, 1983; Bean, 1983; Aitken, 1982; Gosman, Dandridge and Nettles, 1983; Pratt, 1983; Pratt and Felder, 1982; and Gentemann and Pratt, 1983) contributes immensely to our understanding of the process of the undergraduate experience and is extremely important as a guide for enrollment management. Application of the models presented in these studies needs continuing examination. However, in addition, those variables which have shown the most promise for predicting grade point averages and eventual graduation need to be analyzed as tools in the admissions process. While it is very useful to be able to better predict success among college freshmen, it is even more useful to improve the prediction of success among college applicants. While Tinto (1982) rightly argues that there are "unavoidable" limits to reducing attrition, he also points out that among at least one subgroup (Black-Americans) attrition is decreasing, i.e. black students are persisting to graduation at increasing rates.

This is a development upon which traditionaly black colleges in particular need to capitalize. Better prediction of success among these students at the admissions stage is a necessary part of this important process.

In this paper, we argue for the use of non-cognitive variables as part of a better prediction model for academic retention. Our focus has been on the use of variables which can be easily identified prior to an admissions decision and which have applicability for black students enrolling at a traditionally black college.

The non-cognitive data used in this study were not collected during the admissions process but rather during the first month of the freshman year. Earlier collection of the data would be desirable. At this stage of our research we are refining the non-cognitive variables which best differentiate between persistors and non-persistors. The next step will be to use these variables in the admissions process to test how well they distinguish enrollees from non-enrollees.

REFERENCES

Aitken, N. D. College student performance, satisfaction and retention: Specification and estimation of a structual model. Journal of Higher Education, 1982, 53, 1, 32-50.

Astin, A. W. Four critical years. San Francisco: Jossey-Bass, 1978.

Astin, A. W. Preventing students from dropping out. San Francisco: Jossey-Bass, 1977.

Ayres, Q. W. Student achievement at predominantly white and predominantly black universities. American Educational Research Journal, 1983, Summer, 20, 2, 291-304.

Bean, J. The application of a model of turnover in work organizations to the student attrition process. The Review of Higher Education, 1983, Winter, 6, 2, 129-148.

Consent Decree: North Carolina v. Department of Education. No. 79-217-CIV-5 (E.D. N.C., filed April 24, 1979).

Gentemann, K. M. and L. K. Pratt. Sex-Role attitudes, academic aspirations and achievement in a traditionally black institution. Paper presented at the Southern Association for Institutional Research Annual Forum. Daytona Beach, Florida, October, 1983.

Gentemann, K. M. and T. L. Whitehead. The cultural broker concept in bicultural education. The Journal of Negro Education, 1983, 52, 2, 118-129.

Gosman, E. J., B. A. Dandridge, and M. T. Nettles. Predicting student progression: the influence of race and other student and institutional characteristics on college

student performance. Research in Higher Education, 1983, 18, 209-236.

Hill, S. T. Participation of black students in higher education: a statistical profile from 1970-71 to 1980-81. Special Report, National Center for Education Statistics, U. S. Department of Education, November, 1983.

Pascarella, E. T. and D. W. Chapman. A multiinstitutional path analytic validation of Tinto's model of college withdrawal. American Educational Research Journal, 1983, Spring, 20, 1, 87-102.

Pratt, L. K. The Relationship of Non-Cognitive Variables to Academic Success: A Comparison of Traditional and Remedial Students. Paper presented at the Twenty-Third Annual Forum of the Association for Institutional Research, Toronto, Canada, May, 1983.

Pratt, L. K. and N. Felder. An Analysis of Variables Which Discriminate Between Persisting and Non-Persisting Students. Paper presented at the Southern Association for Institutional Research Annual Forum, Birmingham, Alabama, 1982.

SAS Institute. SAS user's guide: basics. SAS Institute Inc., Cary, North Carolina, 1982.

Tinto, V. Dropout from higher education: a theoretical synthesis of recent research. Review of Educational Research. 1975, 45, 89-125.

Tinto, V. Limits of theory and practice in student attrition. The Journal of Higher Education. 1982, 53, 6, 687-700.